Interstate Clean Transportation Corridor: Update

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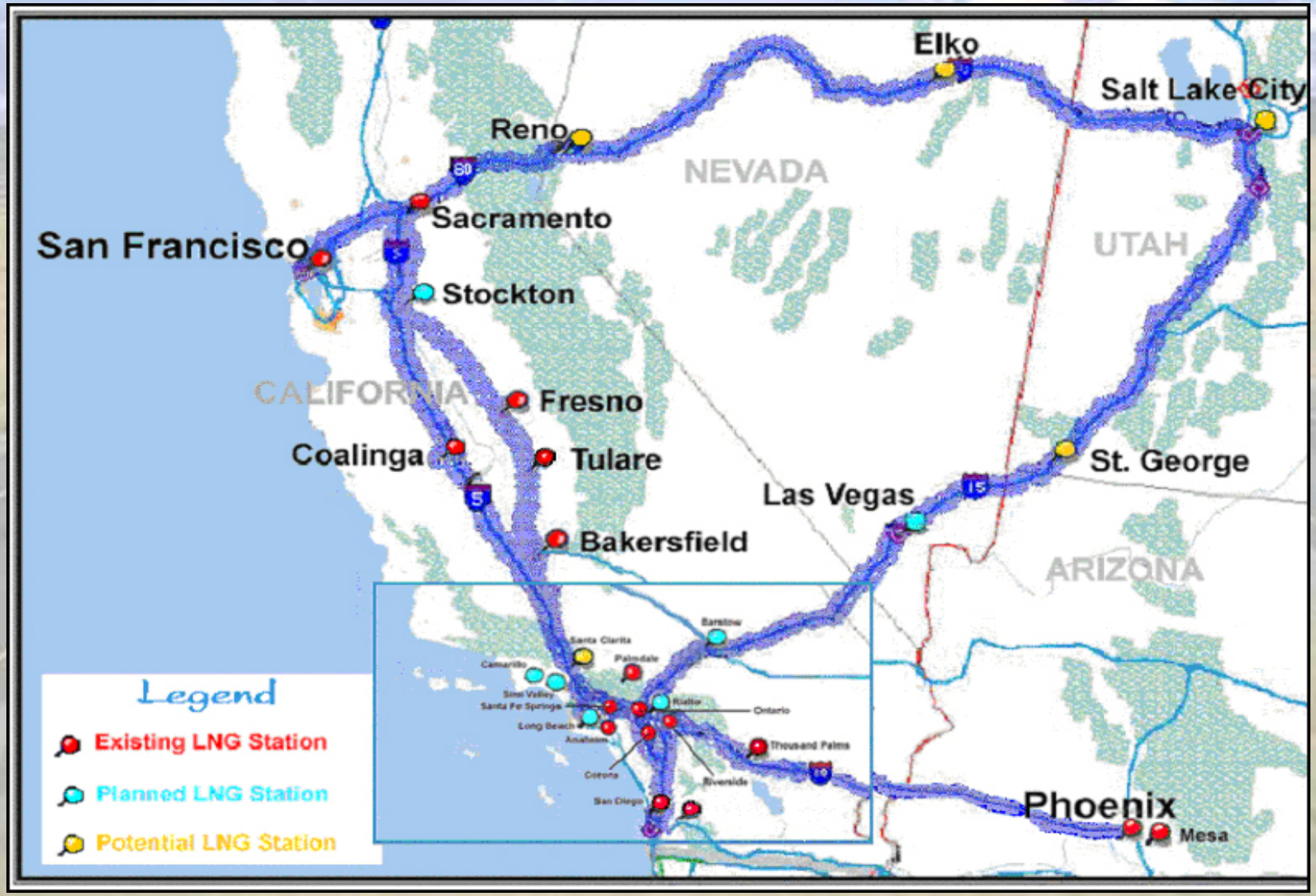
Presentation Overview

- Background
- Accomplishments
- Current Focus
- Place in LNG Transportation Market
- Future Direction
- Elements of Successful Corridors
- Ongoing Challenges

Background

- Started in 1996
- Steering Committee: U.S. DOE; U.S. EPA; CEC; ARB; SCAQMD; MDAQMD; AVAPCD; SANBAG; RCTC
- Goal 1: Reduce air pollution/petroleum consumption by increasing the market penetration of clean, alternative fuel heavy-duty engine technologies.
- Goal 2: Build a sustainable network of infrastructure to support over-the-road heavy-duty truck fleets using alternative fuels.
- Focus: Interstate trucking along triangular corridor of I-5, I-15 and I-80

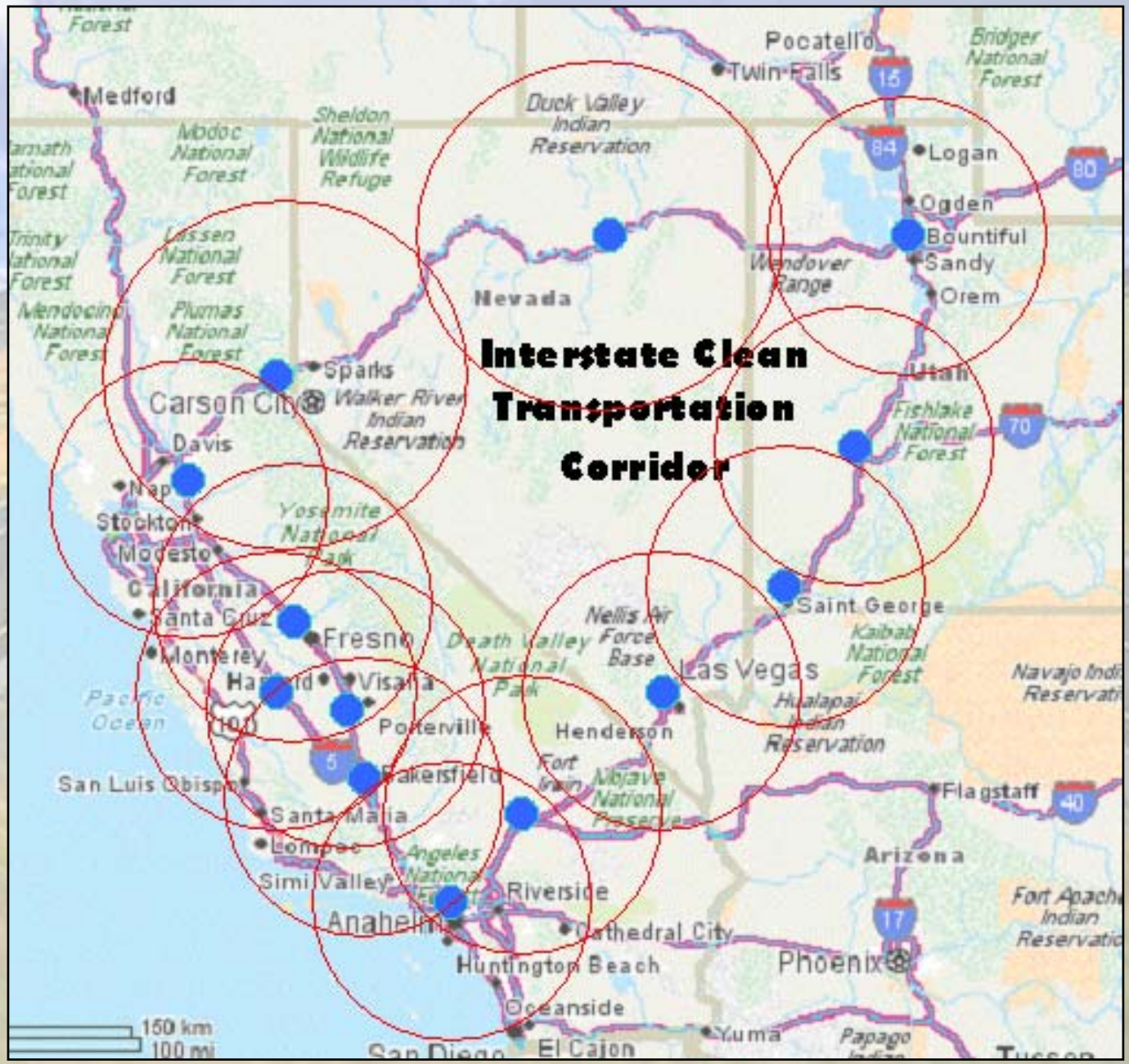
Interstate Clean Transportation Corridor (ICTC)



Principles of Clean Fuel Corridor Development

- It's the trucks, stupid!
- When faced with a choice of the chicken or the egg, cook both..
- It takes a village
- Commercialize, commercialize…
- Concentric circles

The Concentric Circles of the ICTC

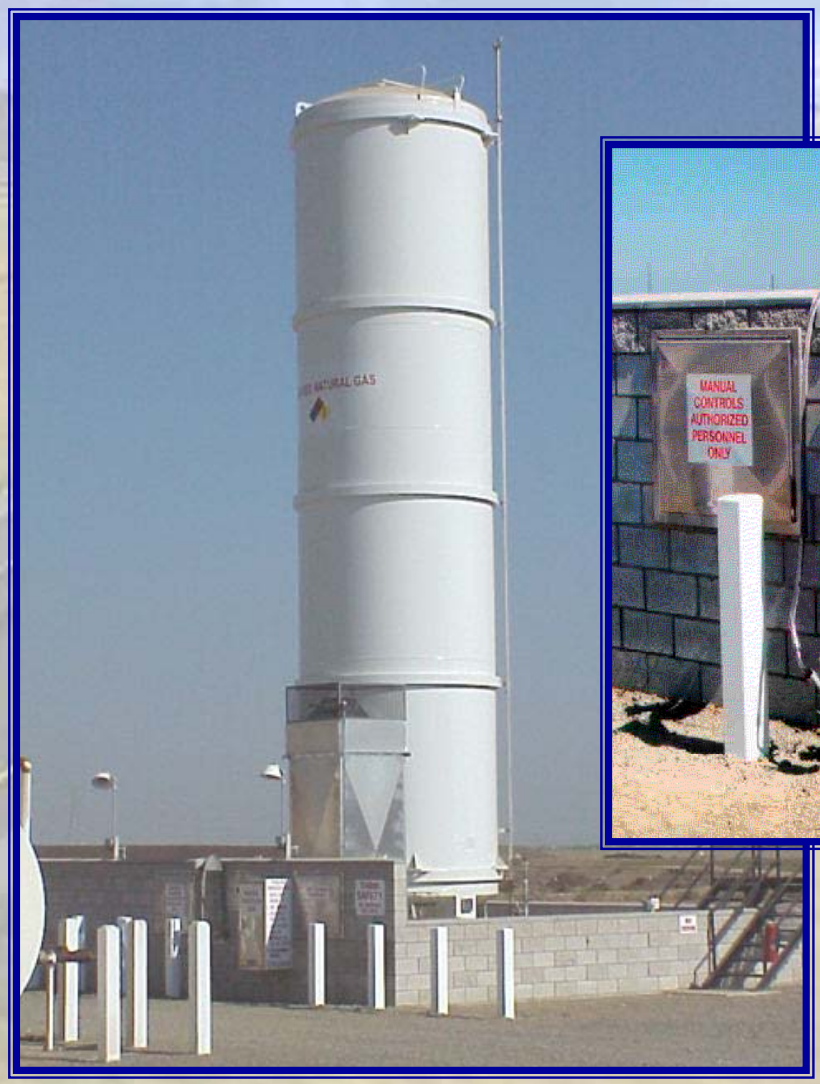


ICTC Accomplishments

Secured $23.8 million in grants to:

- **Build 23 Natural Gas Fueling Stations;**
- **Deploy 514 new heavy-duty AFVs and 160 local delivery vehicles to utilize this infrastructure;**
- **Displace 4.3+Million Gallons of Diesel Consumption Per Year;**
- **Reduce NOx and PM Emissions by 435+ Tons Annually; and,**
- **Generate nearly $100 Million in Economic Activity.**

ICTC Fuel Stations: Harris Ranch, Coalinga



ICTC Fuel Stations: Vons, Santa Fe Springs

ICTC Fuel Stations: City of Tulare

ICTC Fuel Stations: Waste Management, El Cajon

ICTC Fuel Stations: USA Waste, Fresno

ICTC Fuel Stations: Riverside County WMD

Most Recent Project – Downs Fueling in Temecula

Funding Source	Funding Amount	Cost Share
SCAQMD Natural Fueling Station Infrastructure Program (P2001-35)	$ 250,000	28%
CEC Alternative Fuel PON	$ 225,000	26%
SCAQMD RFP #P2004-09 (anticipated)	$ 203,137	23%
Downs Commercial Fueling	$ 26,315	3%
County of Riverside	$ 25,000	3%
City of Temecula	$ 150,000	17%
TOTAL	**$ 870,000**	**100.00%**

Progress on the ICTC

- By the late 1990's, a growing infrastructure began to emerge.
- By 2001, the corridor concept began to prove itself.
- Several over-the-road interstate trucking companies using LNG and fueling at outside facilities.
- Development of "inter-district" funding programs by the Air Resources Board and AQMDs.

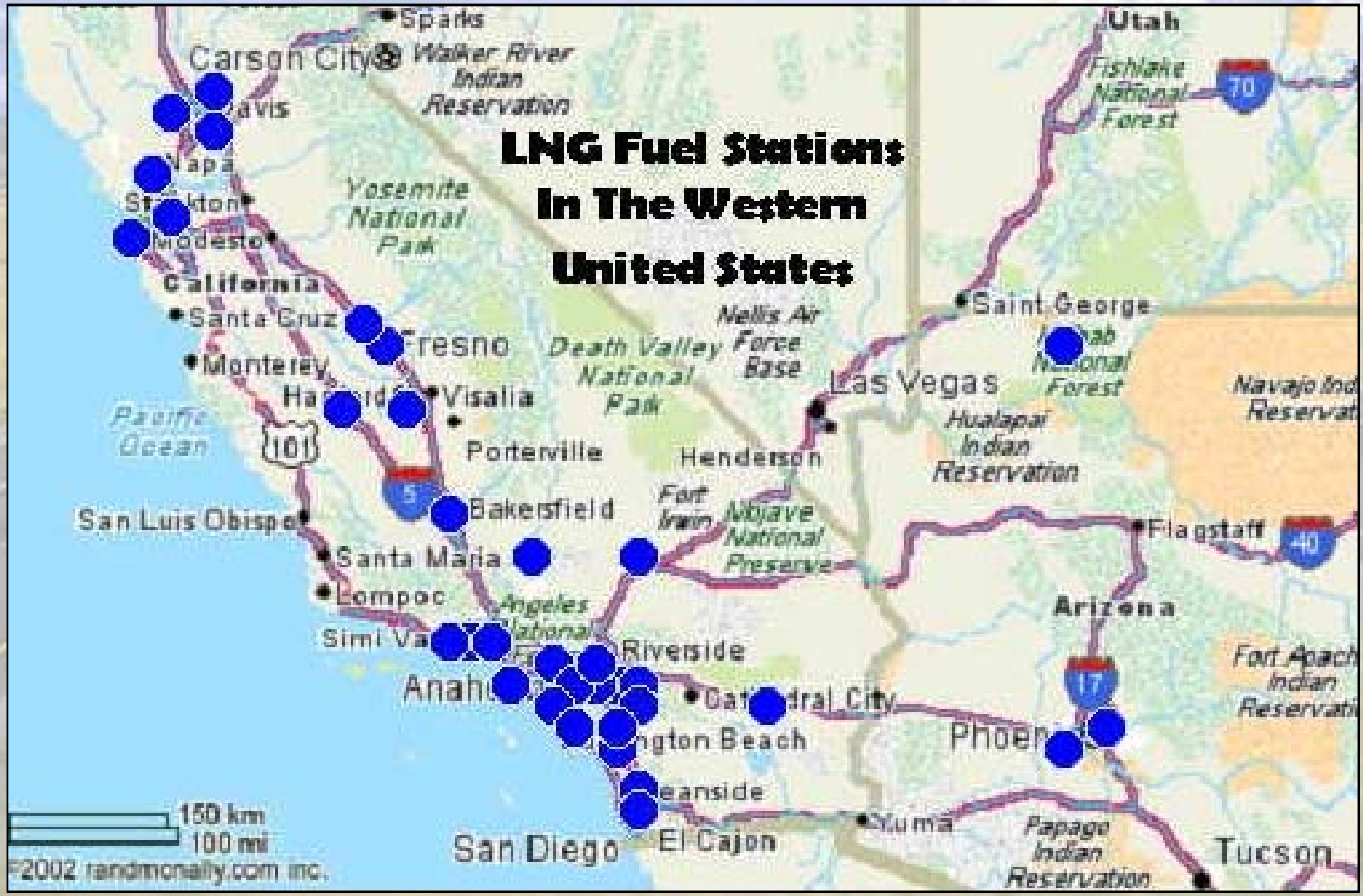
Current Focus of the ICTC

- Increase the number of trucks using existing infrastructure.
- Ensure early adopters continue to use LNG.
- Encourage the use of the corridor by non return-to-base fleets.
- Expand the corridor with a focus on "gap closure."

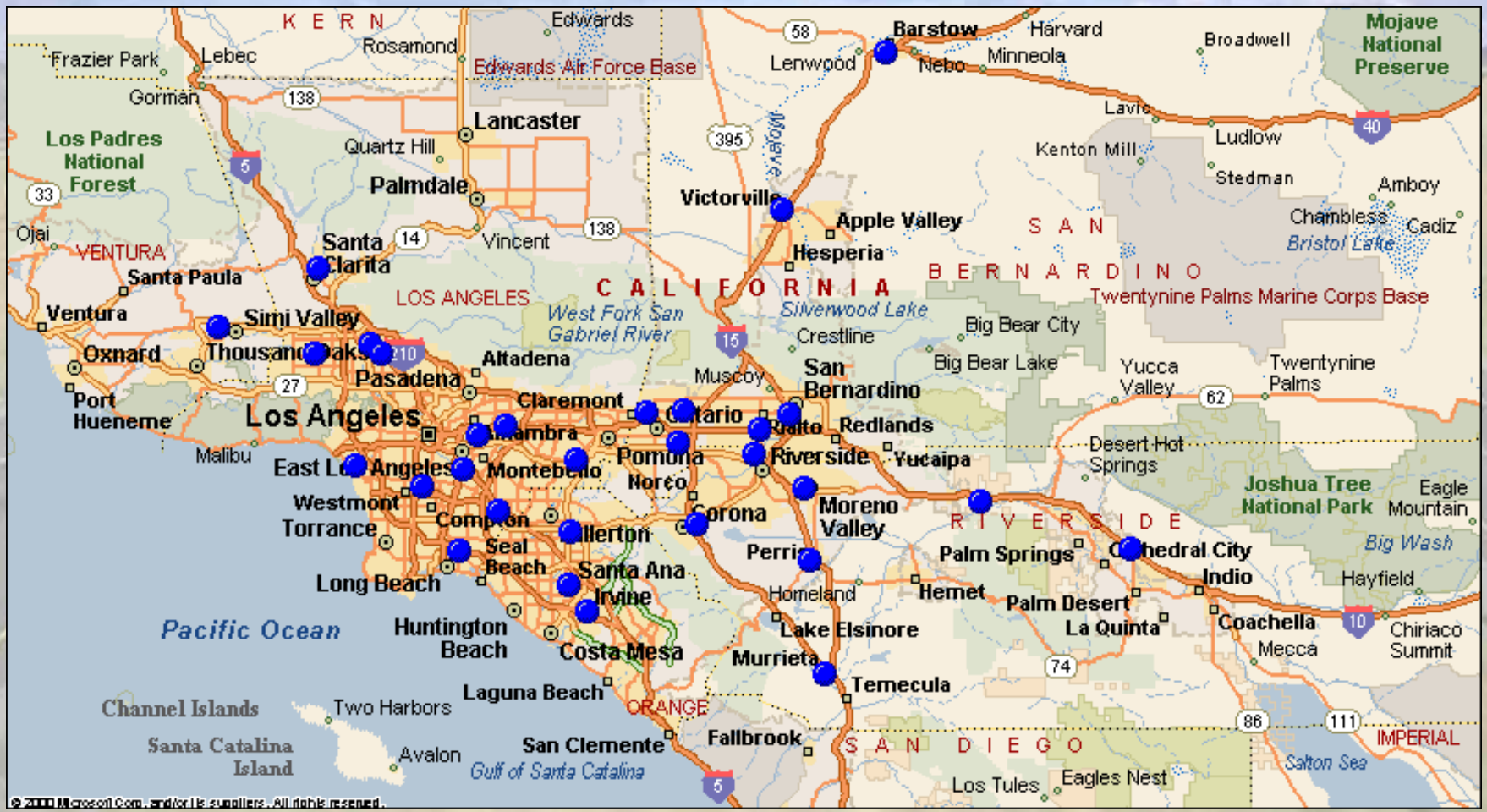
Existing LNG Market
As of February 2004

	U.S.	CA
No. LNG Vehicles	2,411	1,614
No. LNG Stations	49	35
New LNGVs (1-2 yrs)	1,171	726
New Stations (1-2 yrs)	19	18

Existing LNG Fuel Stations



Southern California LNG Stations



Future Challenges, Directions for ICTC

- Help ensure engines are available for over-the-road trucking.
- Support efforts to increase LNG fuel supply.
- Support the development of secondary market for used LNG trucks.
- Begin to explore ways to integrate the next generation of transportation technology, i.e. hydrogen, in to ICTC.

The ICTC and Hydrogen

- DOE, NREL supported effort
- Coordinate closely with existing efforts
  - SCAQMD 5-cities Infrastructure RFP
  - Schwartznegger Hydrogen Initiative
  - CA Fuel Cell Partnership
- Investigate opportunities to utilize existing ICTC projects to encourage consumption of hydrogen
  - Piggyback on existing natural gas infrastructure
  - Explore the use of hythane in existing HD NGVs
  - Look for links with LDV fleets

The ICTC and Hydrogen
(cont.)

- Identify and describe technological, cost challenges (on board vehicle and with infrastructure)
  - H2 production, storage, blending
  - Dispensing technology (H2, CNG capable)
  - On board blending
- Determine the interest level of potential early adopters and secure agreements to participate should demonstration projects emerge

Elements of Successful Clean Fuel Corridors

- **Clean Fuel Corridors (CFCs) are for HDVs**
  - ✓ AFV LDVs limited range, fleet oriented deployment restrict to intra-city travel
  - ✓ HDVs designed to travel between cities, states
  - ✓ Focus on goods movement
- **LNG dominant fuel in CFCs**
  - ✓ Provide range needed in AFV HDVs
  - ✓ 26 public access LNG fueling stations now along ICTC

Elements of Successful Clean Fuel Corridors

(cont.)

- **Corridor developed by linking infrastructure deployment with AFV fleet development**
  - ✓ **Strategically located existing fleets**
  - ✓ **Enough vehicles to economically support station**
  - ✓ **Need sufficient fuel throughput to justify fueling infrastructure**
- **ICTC focuses on commercially available technology**
  - ✓ **Fleets need to deploy numbers of prototypes large enough to support fueling station**

Challenges to AFV Corridors

- Economies of Scale haven't kicked in
- Some incentive programs drying up
- Diesel much cleaner (Oct. 2002 standards); hence…
- …much more difficult for AFVs to meet Air Quality incentive program cost effectiveness tests
- Cost of fuel (natural gas) has increased dramatically
- Technology challenges…

…Technology Challenges

- Need engines @ 400hp+ that are certified to 1.8NOx+NMHC today
- Need engines @ 400hp+ that are certified to 0.2 NOx, 0.01PM before 2007
- Durability and Reliability = Diesel
- HP and Torque per liter = Diesel
- Fuel consumption = Diesel
- Service Cycles = Diesel
- Meet performance requirements, emission standards on broader range of fuel quality
- Whence the "nano-particle" debate?
- Closing the price gap vs. diesel engines

Need for Continued Focus on AFV Corridors

- Air quality still an issue
- CA refinery capacity at max. production (AB 2076)
- Petroleum demand continues to increase with population
- Diesel prices continue to climb
- Natural gas prices expected to come down (terminals in 2008)
- Diesel trucks, engines, and O&M costs and complexity will increase through 2010 and beyond


Q & A